

FIG. 1

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FIG. 2A

Model name	Handling procedure	Action
HA-8160	SR0302	A011
HA-8160	SR0302	A239
HA-8160	SR0302	A021
HA-8160	SR0302	A012
HA-8160	SR0201	A031

FIG. 2B

Model name	Action	Hour	Price of parts	Hyperlink
HA-8160	A011	8	1600	a011.htm
HA-8160	A239	3	0	a239.htm
HA-8160	A021	5	0	a021.htm
HA-8160	A012	20	0	a012.htm

FIG. 2C

Report No.	Model name	Equipment ID	Work data	Symptom	Diagnostic material	Cause	Handling procedure
123456	HA-8160	654321	2002/3/26	T11	J05	R03	SR0301
123455	GA-1160	354320	2002/3/23	E03	J01	R05	SR0503
123453	HA-8160	654321	2002/3/20	T13	J03	R11	SR1101
123452	HA-8160	654321	2002/3/12	T11	J02	R03	SR0302

FIG. 2D

Model name	Handling procedure	Cause-based MTBF		MTBF		Completion report	MTTR	Cost
		Number of days	Number of samples	Number of days	Number of samples			
HA-8160	SR0211	386	33	198	124	123121	48	56,000
GA-1160	SR0302	193	23	123	53	123211	36	25,000
HA-8160	SR0502	123	32	112	46	112321	38	32,000
HA-8160	SR0402		0	19	1	121239	64	98,000

FIG. 3A

Model name	Symptom	Diagnostic material	Cause
HA-8160	T11	J23	R01
HA-8160	T11	J02	R02
HA-8160	T11	J12	R03

FIG. 3B

Model name	Cause	Handling procedure
HA-8160	R02	SR0302
HA-8160	R02	SR0201
HA-8160	R02	SR0408
HA-8160	R02	SR0409
HA-8160	R03	SR0502

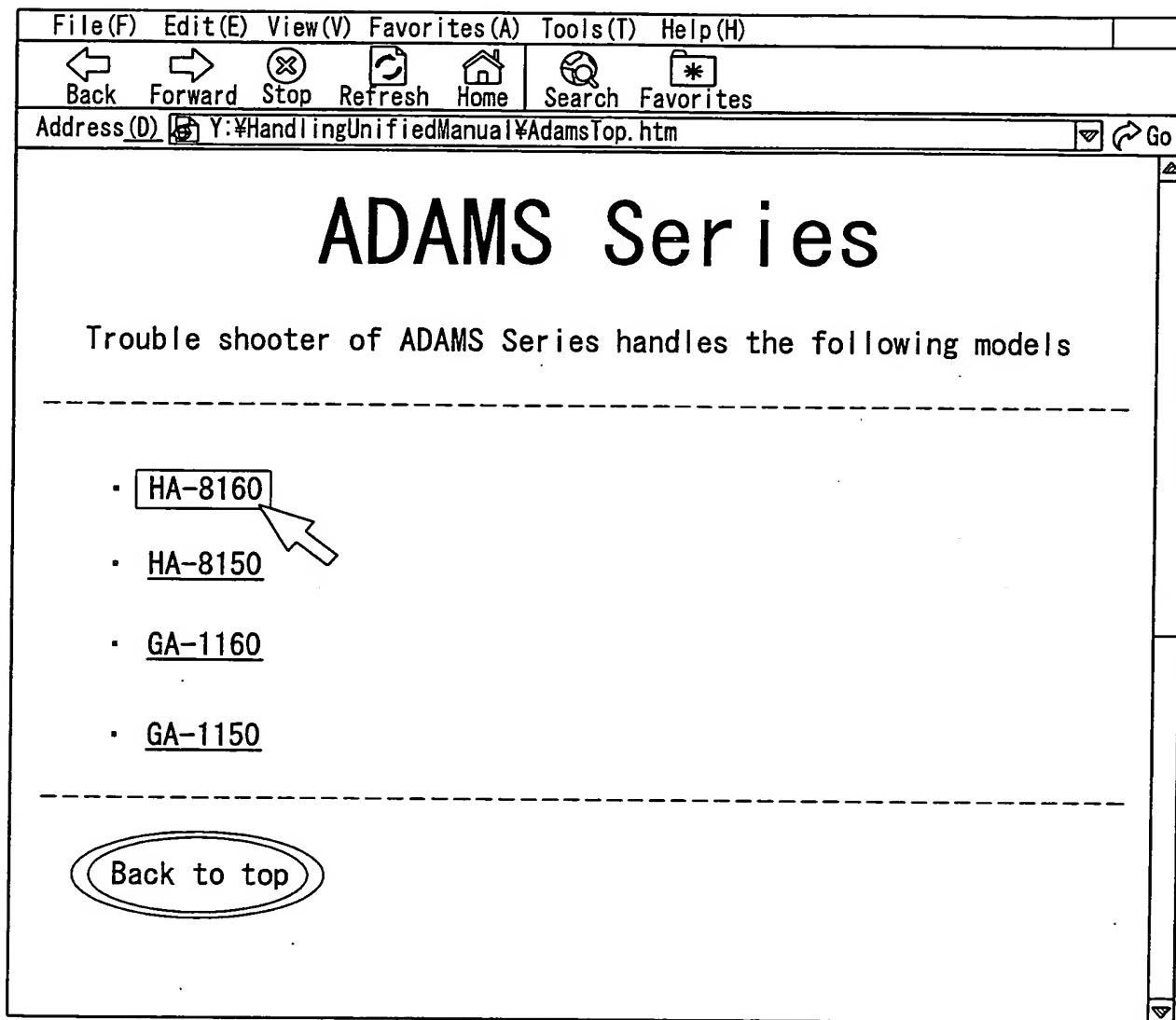


FIG. 4

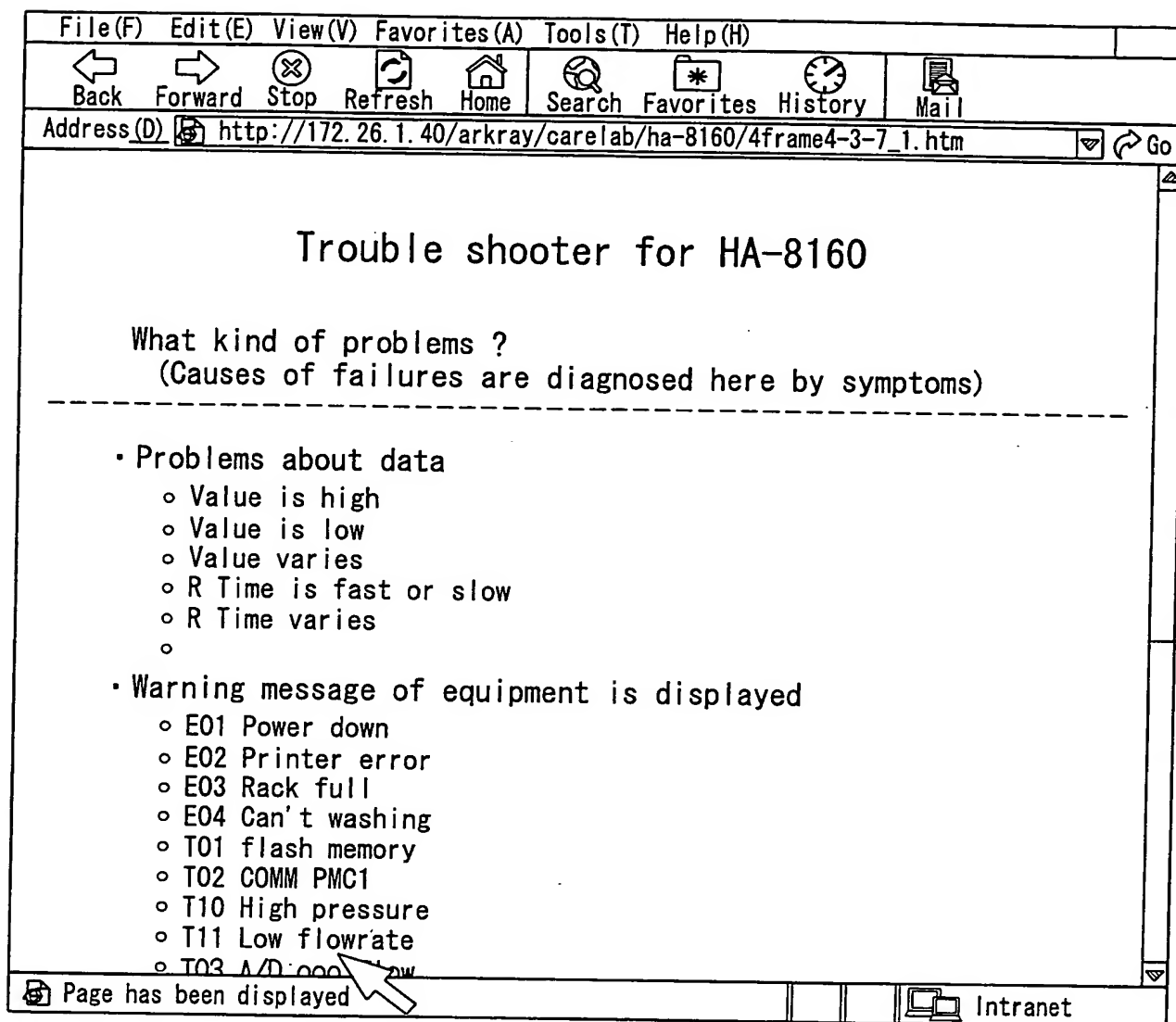


FIG. 5

## T11 Low flowrate

### (Occurrence conditions)

- Pressure of high pressure piping system is lower than  $8 \text{ kg/cm}^2$
- Pressure drop of high pressure piping system is greater than  $70 \text{ kg/cm}^2$
- Detected only during measurement

### Confirmation items

- No.1 J23:Liquid leak from injection valve
- No.2 J02:Bubbles are being generated in flow channel of A liquid
- No.3 J12:Liquid leak at liquid pumping unit
- No.4 J01:Contamination of flow channel of B liquid
- No.5 J09:Liquid leak of priming waste liquid line
- No.6 J04:Concurrence with T18 Drain over B
- No.7 J24:Unusual sound from manifold electromagnetic valve
- No.8 J05:Concurrence with T41 Dilution leak
- No.9 J17:Attachment portion of sampling loop is loose

FIG. 6

(R03) Cause

Path(T11-J02)

Connection between eluant tube and rear panel ⇒ Bad connection

Handling procedure Change to order of MTBF Change to order of Cost  
(order of MTTR)

No.1 (SR0302)	MTTR:36(min) MTBF:193(day) Price of parts:¥1,600 Technical fee:¥25,000
	<ol style="list-style-type: none"> <li>[A011] Replacing seal(8min)</li> <li>[A239] Retightening connection between eluant tube and rear panel(3min)</li> <li>[A021] Confirming piping pressure(5min)</li> <li>[A012] Confirming measurement operation(20min)</li> </ol>
No.2 (SR0301)	MTTR:61(min) MTBF:348(day) Price of parts:¥11,200 Technical fee:¥25,000
	<ol style="list-style-type: none"> <li>[A011] Replacing seal(8min)</li> <li>[A239] Retightening connection between eluant tube and rear panel(3min)</li> <li>[A032] Replacing piping from high pressure valve to damper(15min)</li> <li>[A024] Replacing manifold(10min)</li> <li>[A021] Confirming piping pressure(5min)</li> <li>[A012] Confirming measurement operation(20min)</li> </ol>
No.3 (SR0303)	MTTR:95(min) MTBF:???(day) Price of parts:¥68,800 Technical fee:¥25,000
	<ol style="list-style-type: none"> <li>[A011] Replacing seal(8min)</li> <li>[A239] Retightening connection between eluant tube and rear panel(3min)</li> <li>[A032] Replacing piping from high pressure valve to damper(15min)</li> <li>[A024] Replacing manifold(10min)</li> <li>[A043] Washing nozzle filter of each bottle(18min)</li> <li>[A130] Retightening screws of each piping tube(6min)</li> <li>[A258] Plugging and unplugging connector of pressure testing board(5min)</li> <li>[A008] Replacing plunger sea(5min)</li> <li>[A021] Confirming piping pressure(5min)</li> <li>[A012] Confirming measurement operation(20min)</li> </ol>

FIG. 7

(SR0302) Work procedure

Path (T11-J02-SR0302)

MTTR:36(min) MTBF:193(day) Price of parts:¥1,600 Technical fee:¥25,000

1. [A011] Replacing seal (8min)
2. [A239] Retightening connection between eluant tube and rear panel (3min)
3. [A021] Confirming piping pressure (5min)
4. [A012] Confirming measurement operation (20min)

FIG. 8



**FIG. 9**

Repair report		800391949	Completed
<input checked="" type="radio"/> A) Business trip <input type="radio"/> B) Take home			
Receipt number:	999999996		
Customer code:	888888		
Customer name:	xxx Hospital		
Tel:	075-xxx-xxx		
Station code:	1234		
Station:	Kyoto SS		
Handling personnel code:	888		
Handling personnel:	△△△△		
Product name:	Adams A1C		
Product code:	HA-8160		
Equipment ID:	HA8160109999		
ROM Ver:	1.08		
<div style="display: flex; justify-content: space-between;"> <div> Receipt date <input type="text" value="2001/11/20"/> <input type="checkbox"/>  Work date <input type="text" value="2001/11/20"/> <input type="checkbox"/> </div> <div> Delivery date <input type="text" value="20011029"/>  Work time <input type="text" value="13:30"/> <input type="checkbox"/> ~ <input type="text" value="14:15"/> <input type="checkbox"/> </div> </div>			
Path input:	<input type="text" value="T11"/> <input type="button" value="▼"/> <input type="text" value="J02"/> <input type="button" value="▼"/> <input type="text" value="SR0302"/> <input type="button" value="▼"/> <input type="button" value="New creation"/>		
Main symptom:	T11:flowrate Bubbles are being generated in flow channel of A liquid		
Main cause:	Eluant tube, Connecting portion of rear panel ⇒ Bad connection		
Content of treatment:	<ul style="list-style-type: none"> <li>• Replacing seal</li> <li>• Retightening connection between eluant tube and rear panel</li> </ul>		

FIG. 10

Repair report		800391949	Completed
<input checked="" type="radio"/> A) Business trip <input type="radio"/> B) Take home			
Receipt number:	999999996		
Customer code:	888888		
Customer name:	xxx Hospital		
Tel:	075-xxx-xxx		
Station code:	1234		
Station:	Kyoto SS		
Handling personnel code:	888		
Handling personnel:	△△△△		
Product name:	Adams A1C		
Product code:	HA-8160		
Equipment ID:	HA8160109999		
ROM Ver:	1.08		
<div style="display: flex; justify-content: space-between;"> <div> Receipt date <input type="text" value="2001/11/20"/> <input type="checkbox"/>  Work date <input type="text" value="2001/11/20"/> <input type="checkbox"/> </div> <div> Delivery date <input type="text" value="20011029"/> <input type="checkbox"/>  Work time <input type="text" value="13:30"/> <input type="checkbox"/> ~ <input type="text" value="14:15"/> <input type="checkbox"/> </div> </div>			
Path input:	<input type="text" value="T11"/> <input type="button" value="▼"/> <input type="text" value="T11"/> <input type="button" value="▼"/> <input type="text" value="T11"/> <input type="button" value="▼"/> <input type="button" value="New creation"/>		
Main symptom:	T11:flowrate		
Main cause:			
Content of treatment:			

FIG. 11

Symptom:T11:flowrate  
Determine cause  
Select cause location  
Unit:

Flow channel system	▽
Nozzle	
Sampler	
Optical system	
Reaction unit	
Drive unit	

Next

FIG. 12

Symptom:T11:flowrate  
Determine cause  
Select cause location  
Unit:Flow channel system

Set-screw	<div>&gt;</div> <div>&lt;</div>	Eluant tube
Sample loop		Connecting portion of rear panel
Pinch valve		
Pre-filter		
Pre-filter holder		
Guide		

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FIG. 13

Symptom:T11:flowrate  
Determine cause  
Cause location:Eluant tube,Connecting portion of rear panel  
Select cause (stress)

Bad connection	▼
Wear	
Deformation	
Grease loss	
Disconnection	
Short circuit	
Slip off	

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FIG. 14

Symptom:T11:flowrate  
Determine cause  
Cause:Eluant tube,Connecting portion of rear panel ⇒ Bad connection  
Fill in diagnostic criteria  
Existing diagnostic criteria

No.1 J23:Liquid leak from injection valve
No.2 J12:Liquid leak at liquid pumping unit
No.3 J01:Contamination of flow channel of B liquid
No.4 J09:Liquid leak of priming waste liquid line
No.5 J04:Concurrence with T18 Drain over B
No.6 J24:Unusual sound from manifold electromagnetic valve
No.7 J05:Concurrence with T41 Dilution leak
No.8 J17:Attachment portion of sampling loop is loose

Input column for diagnostic criteria to determine cause

▲ Bubbles are being generated in flow channel of A liquid
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FIG. 15

Symptom: T11: flowrate

Cause: Eluant tube, Connecting portion of rear panel  $\Rightarrow$  Bad connection

Diagnostic criteria: Bubbles are being generated in flow channel of A liquid

Prepare work procedure

A	0	▽	0	▽	0	▽	>	A011 A239 A021
	2							
	3							
	4							
	5							
	6							
	7							
							<	

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FIG. 16

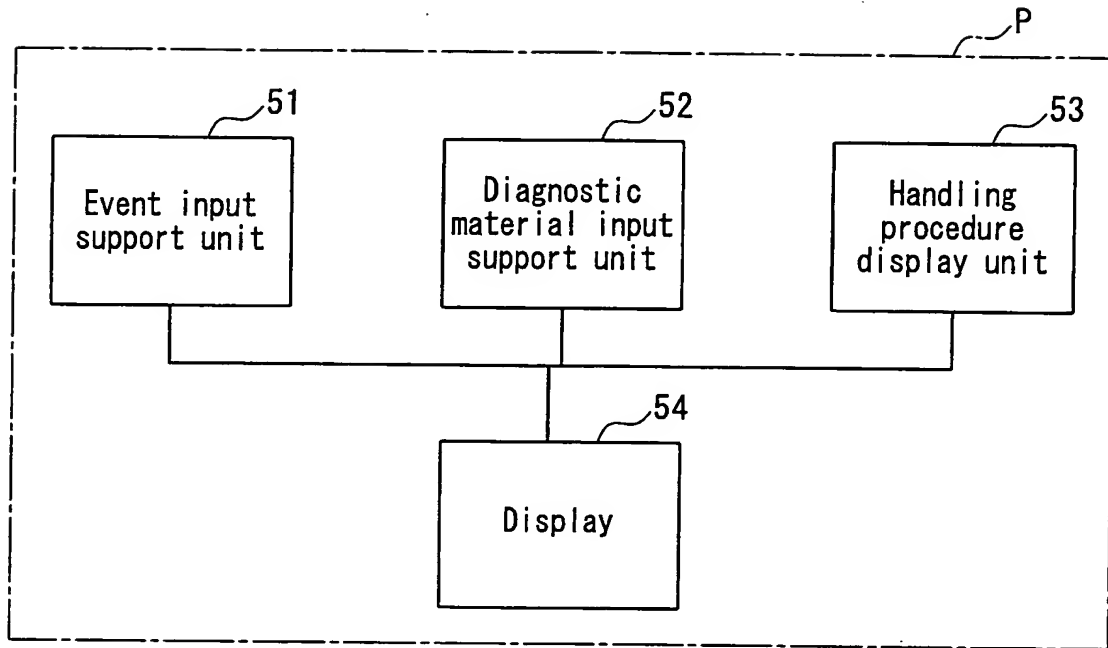


FIG. 17